

DOCUMENT-IDENTIFIER: US 20030153194 A1

TITLE: Plasma etching uniformity control

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**Detail Description Paragraph - DETX (12):**

[0024] The reactant gases which can be controlled to control etch rate include those that produce negative plasmas and those that produce positive plasmas. A gas produces a negative plasma when, under the pressure conditions of the chamber, it produces more negative ions than electrons. A gas produces a positive plasma when, under the pressure conditions of the chamber, it produces more electrons than negative ions.

**Detail Description Paragraph - DETX (13):**

[0025] An example of a gas that can produce a negative plasma is SF.sub.6, which typically produces a negative plasma at chamber pressure of about 60 mTorr or less. When SF.sub.6 is used as the etchant gas, electrons collide with SF.sub.6 to form SF.sub.3.sup.+ and SF.sub.5.sup.+ other sulfuric-fluoride ions, radicals, and more electrons:  
$$e + \text{SF.sub.6} \Rightarrow \text{SF.sub.3.sup.++SF.sub.5.sup.++S.sub.XF.sub.y+e}$$
 (x, y are an integer). An example of a gas that can produce a positive plasma is CF.sub.4. When CF.sub.4 is used as the etchant gas, electrons collide with CF.sub.4 within chamber 102 to produce CF.sub.3.sup.+ ions, other carbon-fluoride ions, radicals, and more electrons:  
$$e + \text{CF.sub.4} \Rightarrow \text{CF.sub.3.sup.++C.sub.xF.sub.y+e}$$
 (x, y are integers).